A NOTE ON THE ACTINIC VALUE OF LIGHT by A. KNAPP.

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The practice of photography consists of a series of chemical processes most of which may now be carried out with scientific accuracy. The most difficult and certainly the most important problem with which the outdoor photographer is confronted, is that of estimating the correct exposure for any given subject, and it is unfortunate that so far no infallible and practical method has been evolved whereby scientific exactitude in this matter may be achieved. The exposure of a plate decides once and for all the possibilities of the resultant negative. If the exposure has been insufficient, the negative will show a lack of detail in the shadows of the objects photographed; a lack of detail which no subsequent process can supply and for which the only remedy is the exposing of another plate.

Every photographic textbook devotes many pages to this matter and emphasises the importance of sufficient exposure as being the basis of all good photography, a view which would surely be supported by experienced photographers. That the problem of sufficient exposure is not easy of solution will be obvious when it is remembered that a photograph of the luminous filament of an electric lamp may be secured in a fraction of a second with the cheapest camera now on the market, but to secure a photographic record of the fine scratches on a blackboard illuminated by the same electric lamp and with the same camera might require several hours.

Correct exposure should be determined by a measurement not only of the quantity of light admitted to the plate, but also, which is far more important, of the quality of that light. The quantity of light might with experience be estimated by the appearance of the image on the ground glass focussing screen, or by an instrument designed to measure the visual intensity of the light falling on the densest shadows of the objects to be photographed, such as, for example, the "Heyde Photometer."

Unfortunately there is no fixed ratio or connection between the visual brightness of light as appreciated by the eye and the chemical or actinic force of light to which the photographic emulsion is sensitive. The eye is most sensitive to the yellow portion of the spectrum, while all ordinary photographic plates and films are most sensitive to the blue, violet, and ultra violet

rays, quite blind to red and some greens, and only slightly sensitive to orange and yellow. This is the explanation of the hopelessly incorrect rendition of many colour schemes in monochrome. For instance, a rich blue dress with a bright yellow sash would be photographically represented as a white dress with a black sash.

The problem of correct exposure requires for its solution a measurement not only of the intensity, but also of the actinic value of the light which is falling on the subject. This fact has long been recognised, and many simple instruments have been designed for the purpose of making such measurements.

The principle on which these actinometers are designed is as follows:

A piece of sensitised paper is exposed to the light falling on the subject until it is darkened to the same tone as a standard tint with which it is to be compared. The time in seconds which elapses during this process is counted and the figure thus obtained constitutes a measurement of the actinic force of the light, and a base from which to calculate or estimate the correct exposure.

Another plan which of course is based on observations of the actinic value of light is that of taking into consideration the month, hour, kind of weather, speed of plate, lens aperture and general nature of the subject, and consulting tables or a slide rule compiled from the experience of many workers. The Burroughs and Wellcomes calculator is an excellent example of this system of exposure meter.

All these systems or methods of calculating exposures regard bright sunlight during the middle hours of the day as the standard of actinic value, and all are equally unanimous in recommending that for other conditions of light such as diffused light when the sun is behind clouds and no well defined shadows are cast, the exposure should be doubled, while if the sky is overcast and no sun is visible, the exposure suitable for bright sunlight should be multiplied by three or four. It is generally accepted that the actinic value of the light of the sun is decreased when passing through clouds.

About twelve months ago I had reason to suspect that the actinic force of bright sunlight varied very greatly in different parts of Australia, notably between Melbourne and Perth. I therefore decided to make tests by means of an actinometer of the actinic force of light in Perth. My observations were made under all varieties of lighting conditions extending over a period of about eight months.

Instead of finding that our bright sunlight recorded the highest actinic value, I found that the value increased from two to four times when clouds were present in the sky. Even heavy rain had the effect of increasing instead of decreasing the force of the light.

Through the kindness of Mr. Johnson, the director of the Magnetic Observatory at Watheroo, and Mr. Tarlton Phillipps of Balingup, I have been able to obtain measurements from these two localities, which are quite in accordance with accepted theories but diametrically opposed to the conditions in Perth. The following are typical measurements, the numbers being the measures of the actinic values. All tests were made between 10 a.m. and 3 p.m.

Place.	Bright Sunlight.	Diffused Light.	No Sun Visible.
Perth	45	12 to 20	15 to 30
Watheroo	10	12	22
Balingup	10	12	20

All these tests were made while interposing my body between the exposure meter and the sun. Only a few tests were made in Watheroo and Balingup while I had made about forty in Perth.

From the above it would appear that the value of diffused light varies but little in these localities and that the actinic value of bright sunlight in Perth is less than one quarter of that of the other two localities. This is supported by the fact that very good results may be obtained in Melbourne with cheap snapshotting film-cameras which, when used for the same class of subject in Perth, gives almost useless results.

It would appear that the unusual conditions to which I have referred might perhaps have a wider application than the mere estimation of photographic exposures, and I have therefore brought the matter before the notice of members in the hope that some effort may be made to map out the area or areas where abnormal lighting conditions exist, and perhaps establish the cause or causes for such variations in the actinic value of the sunlight in this State.

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